SCIENTIFIC TEMPERANCE

By

A·L·TIDD·

CHICAGO

A·FLANAGAN, PUBLISHER.

A BRIEF COURSE

—IN—

Scientific Temperance.

BY

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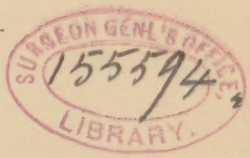
Most powerful is he who has himself in his power.—*Seneca*



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PREFACE.

In the preparation of this work, we have aimed to give briefly all the essential facts concerning the action of alcohol upon the human system. We have aimed to divide the subject into such divisions as will be most convenient, and most firmly impress it upon the mind of the student. At the end of each lesson, questions have been appended to aid the student in his study. Much useful information has been given in the appendix for reference.

Teachers may find it of special interest to perform some simple experiments in the presence of the class; as, dropping a few drops of alcohol in the albumen of an egg and noting the effect, burning a wafer saturated with alcohol. Experiments may be performed upon insects, mice, etc., to show the powerful effects of alcohol and tobacco.

Trusting that this little volume may be the means of saving many from the dangers of intemperance, we submit it to the use of teachers, students, and all who desire to know something of the effects of alcohol, tobacco, etc. If it will serve to benefit its readers in more fully preparing them to know how to regard these powerful drugs, the author will feel that his labors have not been in vain.

—*A. L. T.*

I believe that systematic temperance instruction, which both forewarns and forearms them, to be the road out of bondage for the children of America.—FRANCES E. WILLARD.

Do not drink wine nor strong drink, thou, nor thy sons with thee.—LEV. 10, 9.

INTRODUCTION.

"Knowledge is power," says an old adage, but in no case is it more fully exemplified than in the *temperance question*. The live physical body uses its powers in resisting outside forces which act upon it. Normally, there is a balance of power between body and environment. If environment prevails, we are discouraged; if the normal body is able to prevail, our spirits rise, and our happiness grows. And it is not for the moment only, but we compare the accumulated impressions of the powers outside of us with the powers which our brains develop, and are happy or unhappy according as we feel our superiority or otherwise.

The question arises as to just how much alcohol interferes in this balance of powers.

It clearly can not lessen the power of outside influences which harm us; it can as clearly not increase our own power in so far as they enter into this conflict with the outside world—it rather makes us less skillful and able. What can it do, then? It can deceive us. It dulls our appreciation of powers outside of us until they seem so much smaller that we are sure we can conquer them, and so we gain a feeling of satisfaction. Nine-tenths of those who take strong drink seek this feeling in alcohol. This is their "refreshing" at eventide, their "rest from the day's cares," their forgetfulness of sorrows; but it rests upon a deceit, and at the least trial falls into ruin. He who to-day forgets is not any stronger to-morrow, and so is constantly tempted to a new appeal to his false friend until his senses are so dulled that every duty is forgotten. His holiest interests are but

shadows and mist before his eyes, and he knows nothing more but thirst for the deceitful drink. Even the defenders of alcohol at last call a halt; but they have forgotten that the first steps are much more easily undone than the later ones, when the brain has in a measure lost its power to control. They do not forget through malice, but because they have not rightly understood the physiological effect of alcohol.

The State established the public schools for its own preservation and protection. Then the public schools, while furnishing a liberal education, must become the training school for citizenship. The abuse of alcoholics has led to the enactment of laws, by the different State legislatures, compelling the subjects of stimulants and narcotics to be taught in the public schools, that the children may know of the evils, and physical and moral dangers that may grow out of their use.

We have drawn from the highest scientific authorities, that our readers might have the best information to be had on the subject.

We have used the material in our own work in the class-room, and it has been our experience and observation that every subject becomes more and more impressive as it is made a matter of specific study. Each year the demand has been growing greater and greater for a text-book on the subject of "Scientific Temperance" adapted to the needs of the class-room. To meet this demand, we have prepared the following pages. We have aimed to make the text brief, concise, and adapted to the needs of the public schools.

LESSON I.

ALCOHOL.

The active principle in all fermented and distilled liquors, which has the effect of producing intoxication, is alcohol. The term alcohol is probably derived from the arabic word *al kohol* which, says Bartholomew Parr, was originally used to designate the impalpable power of antimony, with which oriental women stained their eyelids and tinged their hair. Nicholas Lemert in his "Course of Chemistry," published more than two centuries ago, makes use of the following expressions: (1) "To reduce to alcohol, as when a mixture is beaten into an impalpable powder;" (2) "Thus the spirit of wine well rectified is called the alcohol of wine."

Common or ethyl alcohol is a limpid, colorless liquid of a hot, pungent taste; and having a slight but agreeable odor. It can not be frozen and burns easily, giving great heat, little light and no smoke. It is used in spirit lamps and spirit levels. There are at least twelve members of the alcohol family, but in this work we shall only consider one, viz., ethyl alcohol.

The discovery of alcohol has a peculiar and interesting mythological history. By the ancient Egyptian mythology, *Osiris* is represented as the god of wine. From the Greek myths concerning *Dionysus* or *Bacchus*, it is clear that the effects of wine and the spreading of the vine culture are both a part of the work of this god. On some of his expeditions, about the time of the wine harvest, his followers are represented as becoming highly intoxicated. The Roman mythology claims for *Saturn* the discovery of this spirit of wine.

About seven centuries ago we are told that chemists (or alchemists as they were then called) were searching for two peculiar substances, one that would turn common metals into gold, and the other an "elixir of life." One of these chemists at last succeeded in distilling alcohol from fermented liquor. He tasted it and it excited a most ecstatic sensation in his body, causing him to forget cares and troubles and feel young again. This gave him the greatest assurance that he had at last discovered the long sought for "elixir." He imbibed again and again each time finding himself most thoroughly intoxicated. He told his friends that the newly discovered liquid would bring back youth and strength, if they would only partake of it freely. How delusive indeed, instead of bringing back the vigor and strength of youth, his so-called "elixir"

wrecked his system, and the result was death after a wild career of drunkenness.

Alcohol is nowhere found free in nature. It is not a natural part of ripe or unripe fruit. There is only one source of alcohol—namely, the fermentation of sugar or other saccharine matter. Sugar is a product of the vegetable kingdom. But few plants contain free sugar. There are, however, many plants that contain starch, which can be converted into sugar. Therefore, the best vegetable substances for producing alcohol are those which contain the greatest quantities of sugar or starch.

Ethyl alcohol is a compound of carbon, hydrogen and oxygen, the chemical formula being $C_2 H_6 O$. Absolute or anhydrous alcohol has a specific gravity of 793 at the temperature of 60 degrees Farenheit. It boils at a temperature of 173 degrees Farenheit. It has not been frozen by any cold yet produced.

The use of alcohol in beer, wine, cider, whiskey, or in any such liquor, excites an appetite for more alcohol. The exciting of this appetite for more alcohol is due to its great attraction for water. This power of alcohol to create an ever increasing appetite for its use is one of the most fearful things that can be said about it. To take the first glass of cider, beer or wine is a dangerous venture; the

alcohol in it may excite an appetite which will eventually cost one all he is worth in money, in body and in mind for its gratification.

The ancient method of learning the strength of alcohol was to deluge gunpowder with it, ignite the spirit, and if it inflamed the gunpowder as it died out then the alcohol was said to have stood the test or proof, and was called *proof-spirit.* Owing to the attraction of alcohol for water, it is impossible to procure *pure alcohol* by distillation or fermentation. *Proof-spirit*, which is the standard by means of which all mixtures of alcohol and water are judged, contains 57.27 per cent. by volume, and 49.5 per cent. by weight of pure alcohol. The specific gravity of *proof-spirit* is 918.6. When a *spirit* is called *above-proof*, it denotes that it contains an excess of alcohol; while the term *under-proof* has reference to a spirit less strong than the standard.

The best tests for discovering the presence of alcohol are—(1) Its hot, pungent taste, its odor, and its great volatility. (2) Absorbed in asbestos, it burns with a pale blue flame, which deposits no carbon on white porcelain; and when burned in the mouth of an inverted test-tube, containing a few drops of solution of *baryta*, it produces a well marked deposit of carbonate of *baryta*—carbonic acid and water being the product of its combustion.

(3) It dissolves camphor. (4) When boiled with sulphuric acid and a few drops of a saturated solution of bichromate of potash, it reduces this salt to green chromic sulphate.

QUESTIONS.—What is alcohol? From what is the term alcohol derived? What was the earliest use of the term alcohol? What is common or ethyl alcohol? How many members of the alcohol family? For what gods does mythological history claim its discovery? About seven hundred years ago, for what were chemists searching? One succeeded in doing what? Why did he think it was the "elixir of life?" What was the result of his use of the "elixir?" Is alcohol ever found free in nature? What is the only source of alcohol? What are the best substances for producing alcohol? Of what elements is ethyl alcohol composed? What is the chemical formula? What is the specific gravity of anhydrous alcohol? At what temperature does it boil? What is the danger of the use of alcohol in beer, wine, cider, whiskey, etc.? What was the ancient method of learning the strength of alcohol? Why can not pure alcohol be obtained by distillation or fermentation? What is proof-spirit? What is the specific gravity of proof-spirit? When is a spirit called above-proof? When under-proof? What are the best tests for discovering the presence of alcohol?

LESSON II.

FERMENTED AND DISTILLED LIQUORS.

Four things are necessary to fermentation: (1) sugar, (2) water, (3) heat, and (4) a ferment. Fermentation is the change which occurs in an organic substance when brought under the influence of and acted upon by the ferment germs in its process of decay or decomposition. Ferment is a minute germ or microscopic body floating in the air, which possesses the power of inducing fermentation. That kind of fermentation, about which we are now to study, is known under the designation of *vinous*, and forms part of the process in the preparation of alcohol. This process consists in the action of this peculiar germ or ferment, known as yeast, upon any saccharine liquid, by which the sugar molecule ($C_6 H_{12} O_6$) is decomposed into the simpler compounds, namely, two molecules each of ethyl alcohol ($C_2 H_6 O$) and carbonic acid (CO_2). In this process of decomposition the yeast which causes the change does not unite either directly or or indirectly with any of the products of the sugar.

Fermented liquors are alcoholic beverages made by fermentation of saccharine fluids and juices. The most important fermented liquors are the different kinds of *ale* and *beer*, made by the fermentation of an infusion of *malt*, chiefly of barley, but sometimes of other kinds of grain. *Wine* is made by the fermentation of grape juice; *cider* by the fermentation of the juice of apples; *perry* by that of pears; and *palm-wine* by the fermentation of the sap of the different kinds of palm.

In making fermented liquors from corn or barley, it is first placed in a large tank and moistened with water, and then left to sprout. When the corn or barley begins to sprout and grow the starch in it is changed to sugar. Heat is then added to kill the young sprouts and to evaporate the water. In the case of the use of barley the partially decomposed material is then ground. The sugar in it is now dissolved in water, this sweetened fluid is then preserved and ready for fermentation. Yeast is added as a ferment, the carbonic acid gas is now driven off and we have remaining alcohol mixed with water, which is called ale, beer or porter. The processes for making the other fermented liquors are various, though with the same ultimate results.

FERMENTED LIQUORS.

1. Ale contains from 6 to 10 per cent. of alcohol.
2. Beer " " 3 " 10 " " " "
3. Cider " " 5 " 10 " " " "
4. Perry " " 7 " 8 " " " "
5. Champagne " 5 " 13 " " " "
6. Rhenish " " 7 " 9 " " " "
7. Claret " " 7 " 9 " " " "
8. Hock " " 6 " 16 " " " "
9. Tokay " " 9 " 12 " " " "
10. Madeira, Sherry and Port each contain from 16 to 25 per cent. of alcohol.

Almost, if not all, the intoxicating drinks used in ancient times seem to have been the product of fermentation merely. Distillation is the important process, which consists essentially in converting a liquid substance into vapor in a close vessel, by the use of heat, and then conveying the vapor thus produced into another cool vessel, where it is condensed again into a liquid. The object of distillation is to separate the alcohol from the other substances used. Strictly speaking, the *spirits* are produced not by the act of distillation, but by fermentation as before described; and the distillation is merely the process of separating the spirits from the mixture in which they already exist.

In the case of the distillation of corn, the corn is prepared as already described, and then placed in a heated vessel by which the alcoholic vapor is passed through a long spiral tube called the "worm of the still," and condensed in a cool vessel prepared to receive the spirits. These spirits are now called *whiskey*, *brandy* or *wine*.

The first mention of distilled liquors is made by Abulkasen, an Arabian physician, of the eleventh century, though some attribute the invention of it to the northern nations. The early physicians called these spirituous liquors *aquæ vita;* and Lully declares this admirable essence to be an emanation of the Divinity, an element newly revealed to man but hid from antiquity, because the human race were then too young to need this beverage, destined to revive the energies of modern decrepitude. These early anticipations were sadly erroneous.

DISTILLED LIQUORS.

1. Whisky	contains	from	50	to	60	per	cent.	of alcohol.
2. Rum	"	"	60	"	70	"	"	"
3. Brandy	"	"	50	"	60	"	"	"
4. Gin	"	"	50	"	60	"	"	"

In effect there is but little, if any, difference between fermented and distilled liquors when used as a beverage.

QUESTIONS.—How many and what things are necessary to fermentation? What is fermentation? What is the active agent in fermentation? Into what compounds is the molecule of sugar decomposed? What are the most important fermented liquors? Describe the process of preparing corn or barley for fermentation? What is used as a ferment? What chemical change is produced when this ferment is added? How were most of the ancient intoxicating drinks produced?

What is distillation? What is its object? Describe the process of distillation? What is the "worm of the still?" When and by whom was distilled liquors first mentioned? What were they called by the early physicians? What are the principal distilled liquors? Is there any difference in the effect of fermented and distilled liquors?

LESSON III.

ALCOHOL AS A FOOD AND HEAT PRODUCER.

Food promotes animal warmth, sustains muscular motion, keeps the nerves steady, gives power to the brain to act, adds to the force producing power of the body, and contains those elements which are most strength-giving. *Is alcohol a food?* By some authorities it is classed among the food substances. We have already learned that alcohol is chemically allied to the sugars, though its effects are very different from that of sugar. By modern experiments it has been shown that taken into the system in very small quantities, it is decomposed generating heat and force. Alcohol taken in quantities decreases the elimination of carbonic acid and the excretion of urea, and thus tends to corrupt and poison the blood. The sugars have the power of promoting, while alcohol retards and weakens nutrition. If a sufficient quantity of nutritious food be taken and absorbed, the oxygen taken up and consumed in the system is not increased when alcohol is taken;

the alcohol simply seizes upon the oxygen, and prevents the oxidation of the more wholesome and nutritious foods. The heat generated by alcohol is not sufficient to replace the loss of animal heat caused by the excessive amount of warm blood it stimulates in its flow through the skin to be cooled by the outer temperature. In health, if a sufficient quantity of wholesome and nutritious diet be taken, alcohol is not an energy yielding food. Taken in large quantities, it is a deadly poison. Alcohol in a concentrated form exerts a local irritant action on the membranes and tissues of the animal body.

Systematic investigation, upon individuals and upon large bodies of men, by our best scientists, have been made which prove conclusively that as ordinarily used alcohol is not a food. Dr. William B. Carpenter, formerly an *Examiner in Physiology and Comparative Anatomy* in the University of London, says: "There is no reason to believe that alcohol, in any of its forms, can aid directly in the nutrition of the tissues, for it may be certainly affirmed that it is incapable of transformation into albuminous compounds; and there is no sufficient evidence that even fatty matter can be generated in the body at its expense."

Does it relieve thirst? One of its most marked chemical properties is its strong affinity for water.

When taken into the body, it tends to deprive the digestive organs of their water, and thus create thirst rather than relieve it. Again we quote from Dr. Carpenter where he says: "The use of *alcohol* in combination with water, and with organic and saline compounds, in the various forms of fermented liquors, deserves particular notice, on account of the numerous fallacies which are in vogue respecting it. In the first place it may be safely affirmed that alcohol can not answer any one of those important purposes for which the use of water is required in the system; and that, on the other hand, it tends to antagonize many of those purposes." In order that the delicate organs of the body may perform properly the functions which nature has given them to perform, they must have a certain and continuous supply of pure water. Pure water, that most peerless beverage of nature, can only do its work perfectly in so far as it remains free from alcohol. Alcohol by its strong affinity draws the water to itself, thus leaving the organs to become dry and hardened. Investigations which have been made in cases of death from the use of alcohol prove these statements to be true.

Is it useful to persons exposed to the severity of the colder climates? Is it a warmth producing agent when taken as a beverage? Dr. W. B. Car-

penter, says: "For a few minutes after alcohol is administered, to the amount of a gill of wine, or brandy,the temperature rises slightly, after which it falls several degrees below the standard of health, and remains so for hours." Sad experience and observation by the Arctic explorers say no. It is the universal evidence of the participants in the explorations to the Polar regions, that those persons who totally abstain from the use of alcoholic liquor, could best survive the severity of the cold and the hardships of the voyage. Dr. Hayes, the Arctic explorer, says: "While fresh animal food, especially fats, is absolutely essential to the inhabitants and travellers in Arctic countries, alcohol is not only completely useless, but positively injurious. I have known the most unpleasant consequences to result from the *injudicious* use of whiskey for the purpose of temporary stimulation and have also known strong, able-bodied men to become utterly incapable of resisting cold in consequence of the *long continued* use of alcohol."

A sad story is told of twenty-six men, who some years ago were travelling on one of the Great Western Plains. They were overtaken by the cold and night. They had food, clothing, and whiskey, but no fire. They were warned not to drink any whiskey or they would freeze. Three of the number did not drink a drop, and though

they felt cold, they did not suffer nor freeze. The remainder of the party drank of the whiskey, and suffered more or less in proportion to the amount of liquor taken. Those who drank only a very small quantity suffered much, and had their fingers and toes slightly frozen. It was found the next morning that three of the men who had drunk unto drunkenness were frozen to death. Says Dr. Kinne, "Alcohol is not the warming cordial and invigorating stimulant that it is represented to be, but there is a world-full of preconceived opinions in its favor that must be met and overcome before the true view can make its way. But the truth must prevail at last."

Vegetable life speedily decays when brought into contact with alcohol. It causes death in a very short time when given to the lower animals—insects, and reptiles. The more intelligent of the lower animals resent it even in its milder form—as brandy, etc. Alcohol is destructive to life rather than a promoter of it. In any of its forms alcohol is too dangerous a drink to be used as a beverage. It is not a food or drink for man or beast, and is by all medical writers classed as a poison. As a rule, alcoholics should never be taken except for a specific purpose and under the direct and continued advice of a physician of integrity. "There is no such a thing," says Dr.

Alden, "as a temperate use of spirits. In any quantity they are an enemy to the human constitution. Their influence upon the physical organs is unfavorable to health. They produce weakness, not strength; sickness, not health; death, not life."

QUESTIONS.—What are some of the qualities of food? How is alcohol classed by some authorities? To what is it chemically allied? What has been shown by modern experiments? How does it tend to poison the blood? What is the difference between sugar and alcohol in their effects upon nutrition? When a person has sufficient nutritious food, what is the effect of taking alcohol? Why does it not increase the animal heat of the body? What is the effect when alcohol is taken in large quantities? What has been proven by systematic investigation? Who was Dr. Carpenter? What does he say of alcohol as a food? What is one of its most marked chemical properties? What does Dr. Carpenter say of its taking the place of water? What is necessary to the proper performance of the functions of the delicate organs of the body? What is the effect of alcohol on these organs? What does Dr. Carpenter say of its effect upon the temperature of the body? Is it useful to persons exposed to the severity of the colder climates? What is the opinion of Dr. Hayes in this respect? Relate the story of the party traveling on one of the great western plains. What does Dr. Kinne say in regard to its warmth producing qualities?

What is its effect upon vegetable life? What upon the lower animals? May it ever be used as a beverage, with safety? How is it classed by medical writers? How should it be taken? How does Dr. Alden sum up its use and results?

LESSON IV.

EFFECTS OF ALCOHOL UPON THE BONES AND MUSCLES.

Young people should remember that the size, shape, and graceful appearance of the human body is largely dependent upon the bony frame-work. The greatest care should be used to avoid everything that might in any way injure or prevent the natural growth or development of this frame-work. The use of alcohol in any of its various forms as a beverage, by its action upon the digestive organs, blood and the nervous system hinders and prevents the natural growth and development of the bones, and of the whole frame-work of the boy. Instead of making him a strong and vigorous man, his body is weakened and dwarfed. It is said that *gout* and *rheumatism* is very numerous among the poorer classes of people in London, as a result of beer drinking. By preventing the proper supply of nutritious matter in the blood it causes the bones to become diseased in the aged and middle-aged as well as in the youth.

Among the leading scientific men of to-day the idea that alcohol increases muscular power and strength, thus enabling the person using it to perform great feats of labor and to endure great fatigue, is fast coming to naught. It can add nothing to the bodily energies, but on the contrary always tends to lessen its strength and power. It was supposed for generations that some form of alcoholics was necessary to enable soldiers and sailors to perform the arduous tasks which fell upon them at critical times. It was then the custom to issue some sort of "grog" as a part of their rations. But close observation has proven this practice to have been erroneous. This false custom we are glad to say is no longer practiced. "Suppose, for an instance," says Dr. Kinne, "you measure your muscular strength with a 'health lift' or dynameter (by which muscular exertion can be accurately measured), and then take some of the drinks, in the strength-inspiring power of which you have so much confidence, and when you are most exhilarated by it, and feel as if you could shoulder a large fragment of Mount Olympus, measure your strength again. The drink has fooled you, that is all. You felt that you were stronger than natural; you find that the narcotic has been true to its paralyzing nature, and that you are weaker." That would seem to be a suffi-

cient proof, but just now let me call your attention to real, practical, every-day examples which you have seen and will continue to see as long as alcoholics in any form are continued to be used as a beverage. When you see these examples you should remember this fact, *that alcohol is not a strength-producing agent.* For these living examples all you need do is to look round about you and see strong men staggering as they attempt to walk, yea, even more than this, men who cannot stand erect when under the influence of any of the intoxicating beverages.

Dr. J. C. Hutchinson, late president of the New York State Medical Society, says: "The amount of disturbance in the muscular system that is produced by alcohol varies greatly under different circumstances. It may be very great or very slight according as a great or small dose of liquor is taken. The tongue, the organ of speech, is a muscle that early betrays the presence of drink. This is the cause of what is called the 'thick' speech of the drunken man, whose words are not correctly uttered but are dropped, cut short, or run together in an unusual and oftentimes an unintelligible manner. 'Seeing double' is another muscular disturbance in drunkenness. At a certain stage of the drunken fit every single object appears to the victim to be double. In this case the muscles that

move the eye-ball are at fault, they are temporarily deranged, so that the two eye-balls cease to move harmoniously, and are no longer brought to bear upon the objects before them, as in health, and the image of two objects are reported to the brain while in reality there is only one. Then, too, objects that are at rest appear to be in motion, because the eye-balls are affected by an unsteady, rolling motion." The muscles of the body and limbs are similarly affected. It has been observed that while a man is intoxicated his hands are unsteady, trembling like the palsied. Draughtsmen who habituate themselves to the use of alcohol so completely lose control of their muscular power, and the once perfect lines cease to be perfect and become unsteady and inaccurate. So it is with the legs of the intoxicated man, when you see him seeking some friendly lamp-post or other convenient object upon which he may lean for support. His once strong and vigorous limbs, which so gracefully carried his body from place to place, have been narcotized and have lost their power. If the habit of strong drink be continued, the muscles may become paralyzed. Thus by the evil of strong drink, men doom themselves to misery and suffering throughout the remainder of their earthly career.

Do not some drinks make the muscles larger? It is claimed that ale and beer tend to make some

people fleshy. To become fat and fleshy and growing muscular and strong are very different things. To load the body with a great quantity of fat is positively injurious and does not enable anyone to do any more work. These two drinks tend to make an excess of fat, this hinders the proper action of the muscles and may seriously impede the action of many of the organs of the body. This excess of fat accumulates around the heart of many beer drinkers, preventing its normal muscular action, thus causing death.

QUESTIONS.—Upon what does the size, shape and appearance of the body depend? Care should be used to avoid what? How does the use of alcoholic drinks hinder and prevent the natural growth of the bones? How does it render the body? What is said of the effect of beer drinking upon the poorer classes of London people? What is said of the idea that alcohol is a strength-producing agent? On the contrary what does it tend to do? For generations what was the belief in regard to this question? What was the custom then? What was the result of close observation in this matter? What does Dr. Kinne say of alcohol as a producer of muscular strength? What other examples have we to prove that alcohol does not yield strength? Who was Dr. J. C. Hutchinson? What does he say in regard to the effect of alcohol on the muscles? How does it affect the muscles of the body and limbs? What liquors tend to make the muscles larger? How does it increase their size? What effect does fatty enlargement have upon the heart?

LESSON V.

EFFECTS OF ALCOHOL UPON THE DIGESTIVE ORGANS.

THE STOMACH.

The stomach is one of the most important organs of the human body. When the stomach is diseased, or when hunger is preying upon us, our disposition is irritable; our pleasing temperament is gone; and our strong, physical, as well as moral courage fails us, and we turn cowards, when had our stomachs been in the proper condition, we should have been the bravest among the brave. During the last three-quarters of a century, much has been said and written about the effects of alcohol upon the stomach. If pure alcohol were taken into the alimentary canal, the organs would be paralyzed, and death follow within a very few minutes. But this form is never taken into the stomach only by mistake. So we shall turn to its use as a beverage. Says Dr. Palmer, "When an ordinary dram of spirit and water, or of wine, is taken by one not accustomed to it, the first notice-

able effect upon the stomach is to produce a feeling of warmth in it. If the stomach be empty, this effect is more decided than when taken at the time of a meal or soon after." This may be accounted for by the fact that the food in the stomach would dilute the liquor to such an extent that the immediate action of the alcohol would not be perceptible. As soon as the food and the alcohol together can be absorbed, a relaxation and enlargement of the blood vessels is noticeable. More blood now remains in the vessels, and they show an inflamed and irritated condition.

In the famous case of Alexis St. Martin, a Canadian *voyageur*, who received a wound which laid open his stomach, and which in healing, left a permanent orifice about as large around as a silver dollar, Dr. Beaumont, the physician under whom the wounded man was placed, was enabled to make numerous observations. From observations made in this case these facts were learned, *viz.*, that when an ordinary drink of the spirit or of wine was taken, the mucous membranes of the stomach suddenly became inflamed and red, and the gastric juice became thick and unnatural in its appearance. When large quantities of the drink was taken, the inflammation became greatly increased, and drops of blood could be seen exuding from the walls of the stomach.

When any of the alcoholic drinks are taken into the stomach, the alcohol immediately seizes upon the moisture of the lining membrane of that organ drawing the water from that membrane and from the gastric juice secreted by it, and even the blood from the vessels of the inner walls is forced to yield up its water, until the alcohol is completely diluted. It is by this union of the alcohol and water that heat is generated, which occasions a sensation of warmth that drinkers enjoy. The heat thus generated does not extend to the whole body, and is not sufficient to recompense for the loss sustained by the forced-over-exertion of the glands and blood-vessels.

One of the very first effects of any alcoholic beverage taken into the stomach is as we have already learned, to increase the flow of blood to the mucous lining of that organ. Thus the gastric glands are compelled to secrete an unusual amount of gastric juice. Now if this be true, some would say, does it not aid rather than detard digestion? The question is easily answered. The active principle in the gastric juice is *pepsin*. While the alcohol does cause an increased flow of gastric juice, it does not aid digestion, as it draws from the juice its water, thus precipitating the pepsin and rendering it useless. The tendency of alcohol is to preserve the food, by preventing its decomposition, and there-

fore can not be said to aid in its digestion. This unusual stimulation in a short time produces very marked and very serious changes in the mucous lining and glands of the stomach. The continued use of such beverages cause the mucous membranes to become inflamed and diseased, and the glands to secrete an imperfect juice. Now digestion becomes very difficult, and in the earlier stages of the diseased condition of the stomach we have what is called *alcoholic dyspepsia*. This disease is very numerous among the moderate drinkers. The symptoms are a slight loss of appetite in the morning; during the early part of the day the patient feels languid and weak; retching and throwing off a little phlegm or even vomiting. The disease and inflamed condition of the gastric glands causing them to yield an imperfect juice is what is known as *gastric catarrh*. This disease on account of the heated and inflamed condition of the organ demands more and more liquor to lessen the unendurable pain. Thus the individual finds himself doomed to a drunkard's life and a drunkard's death.

The long continued use of any distilled or fermented liquor causes permanent enlargement of the blood-vessels. The tissues become dry, thickened, and break, forming ulcers. Owing to the stage of the disease, the ulcers may be either large or

small. After the stomach has been thus affected, there can be but little hope of its ever being cured.

Now let me give you a word of warning in regard to the use of stomach bitters, cordials, etc. One writer says, "In health, alcohol nowise plays a friendly part in regard to digestion. And it is just here that a mistake is made by many persons who have been deluded into the use of 'cordials'; these are very strong alcoholic liquors, and they are supposed by those who use them to be especially appropriate at the end of a hearty meal. Absinthe, the pet poison Parisian, is one of these falsely-named 'cordial' substances. These cordials are never less welcome than after a substantial meal. So many misleading names have been given to beverages (cordials, bitters, etc.), that many persons have used them without knowing the evil consequences which follow. It is made clear by recent proofs that the so-called cordials are the most rapidly poisonous of all the spirituous beverages."

When one observes the effects produced and what the use of alcoholic beverages may cost the user, he is constrained to answer that the only safe rule to adopt is individual abstinence.

QUESTIONS.—What general effect upon the individual has disease of the stomach, or hunger? What would be the result of taking pure alcohol into the alimentary canal?

What is the first effect of an ordinary dram of spirit and water taken by one unaccustomed to it? What difference does it make if the stomach be empty? How is this accounted for? What effect has it on the blood-vessels of the stomach? Who was Alexis St. Martin? With what accident did he meet? Who was the attending physician? What was learned by Dr. Beaumont from observation in this case? When any of the alcoholic drinks are taken into the stomach, upon what does the alcohol immediately seize? What is occasioned by this union? By the increased flow of blood to the mucous lining of the stomach it affects the gastric glands in what manner? Why does this not cause it to aid in digestion? What is the result of this unusual stimulation? What is the result of the continued use of such beverages? In what disease does this result? Among what class of drinkers is this disease found? What are its symptoms? What is the disease called when the gastric glands yield an imperfect juice? What demands does this heated and inflamed condition of the organ make? In what manner does the long continued use of fermented or distilled liquors affect the blood-vessels or tissues? Can these ulcers be cured? What is said of cordials, bitters, etc.?

LESSION VI.

EFFECTS OF ALCOHOL UPON THE DIGESTIVE ORGANS.

THE LIVER.

From the study of anatomy we learn that the liver is situated to the right of the stomach. As regards the health of the individual the liver is one of the most important organs in the body. It acts upon the food passing through it from the stomach and converts a part of it into blood. By the chemical changes which are affected upon the food it produces heat. It is one of the sources of the purification of the blood, by its preparation of the waste material to be carried out of the system. It secretes bile, one of the important juices necessary to the process of digestion. The liver like all the other organs and tissues of the body is composed of cells. Probably one of the most marked physiological distinctions of the liver is its capacity for holding actual substances within its cellular parts. In all *post mortem* examinations in cases of poisoning by *arsenic*, *strychnine*, and other poisonous substances, in making the analyses, we turn to the

liver, with a firm expectation of finding traces of the poison, if they are at all to be found. This organ, as it were, is the great central depot of all foreign substances taken into the body. So it is with alcohol.

Nearly all the alcohol taken into the stomach is taken up by the blood-vessels of that organ and carried by the portal vein directly to the liver. Here its first action is to irritate that organ. The same as in the stomach, it causes a distension and enlargement of the blood-vessels, and a larger accumulation of blood than is necessary for its proper functional action. In order that the liver may perform its part in digestion, its cellular structure should be almost or entirely free from fat. The use of alcohol sometimes produces a growth of fatty tissues in the liver, and thus prevents a healthy action. Being in this way laden with fatty tissue, the liver is no longer able to secrete bile or to store up sugar for the use of the body. This health preserving organ failing in the performance of its work, the whole system becomes deranged. "There is," says Dr. Palmer, "what is called biliousness—disturbance of the stomach, a coated tongue, foul breath, deranged bowels, headache, dizziness, dimness of sight, distressing dreams, a feeling of fullness in the side and stomach, and general uncomfortable sensations." The long continued use of alcoholic drinks produces another change in the

cellular organism of the liver by which the whole organ becomes very much contracted and shrunken. It is said to be "hob-nailed," that is, it becomes roughened, harder, and smaller, and is known among medical men as the "drunkard's liver." "By the time this change occurs," says Dr. Richardson, "the body of him in whom it is developed is usually dropsical in its lower parts, owing to the obstruction offered to the returning blood by the veins, and his fate is sealed." In every case of structural degeneracy of the liver the prognosis is bad.

In this brief sketch we have not tried to give you all the evils and diseases that may be traced to the effects of alcoholic drinks upon the liver, since a derangement of that organ leads to a diseased condition of the whole system.

QUESTIONS.—What is the location of the liver? What are some of its functions? What is one of its most marked physiological distinctions? What is done in all *post mortem* examinations in cases of poisoning? How does the alcohol get to the liver from the stomach? What is the first effect of alcohol on the liver? What is necessary in order that the liver may perform its part in digestion? How does alcohol effect the cellular structure? When the liver thus becomes laden with fat what is the result? What are the symptoms as given by Dr. Palmer? What other change takes place from the long continued use of alcoholic drinks? This condition is known as what? According to Dr. Richardson what is the result in such cases? What is the prognosis in every case of structural degeneracy of the liver?

LESSON VII.

EFFECTS OF ALCOHOL UPON THE CIRCULATORY SYSTEM.

THE HEART.

The heart, the great engine of life, among the ancients was thought to be the seat of love. There said they, was the seat of all that is pure, good and noble in man as well as the evil passions of the soul. But science has progressed beyond that idea of the ancients, and to-day the psychologists tells us that the brain is the seat of all mental power. While the heart is thus disrobed of its romances, the ever searching science has revealed the truth concerning it, which is even more wonderful than all the mysteries of the past. This wonderful heart beating at the rate of seventy times per minute, with each pulsation sends the blood throbbing on its way from the top of the head to the soles of the feet. Seventy pulsations per minute, four thousand two hundred per hour, one hundred thousand eight hundred times per day, moving upwards of thirteen tons of blood is the enormous work of this little

organ, which is not much larger than your fist. No machine made by the hand of man can ever equal its mighty power. Thus the play of its faithful valve and the rhythm of its unfaltering throb continues right on from the beginning to the close of this mortal life when it forever ceases—the valves remaining closed and the throbbing stilled by the command of the Great Master-Workman. Well and truly hath the poet Holmes summarized, in beautiful poetic lines, the workings of the heart:

> "No rest that throbbing slave may ask,
> Forever quivering o'er his task,
> While far and wide a crimson jet
> Leaps forth to fill the woven net,
> Which, in unnumbered crossing tides,
> The flood of burning life divides;
> Then, kindling each decaying part,
> Creeps back to find the throbbing heart."

So enormous is the work to be performed by this organ that we cannot afford to take the slightest chance of increasing its burden or of hindering its action.

The heart is a vital organ, therefore, its action and condition is of vital importance. The earliest perceptible effect of a moderate dram of any of the intoxicating liquors is a more rapid heart-action, attended by a sensation of warmth within and a general glow upon the surface indicating an ap-

parent increase of vitality. What the lash or spur is to the horse, so to speak, alcohol is to the heart. It causes an over-exertion, but does not increase the strength. A report of an experiment made by one of our scientific men states that a single glass of liquor causes the heart to make eight thousand extra pulsations. By this action the period of rest between the heart-beats is reduced and the heart's nutrition necessarily lessened.

Even among members of the medical profession, some suppose that fermented and distilled liquors actually stimulate the heart; that is, that they increase its power causing it to propel the blood with greater force and activity. A few examples of experiments that have been made by scientific authorities, and a careful study of the nature of the drug will tend to disprove this notion.

It is universally held by physiological investigators that the direct action of alcohol upon the muscular tissue and nerves of the heart, and upon its power and activity is practically the same in the lower animals that it is in man. Therefore experiments and observations made upon the lower animals tend to show that similar effects would be produced in man. After making numerous experiments upon the heart of frogs for the purpose of determining the comparative effects of the different qualities of alcohol, Doctors Sidney Ringer and

Harrington Gainsbury, of London, declare: "That by their direct action upon the cardiac tissue, these drugs are clearly *paralyzant* (and not stimulating), and that this appears to be the case from the outset, no stage of increased force or contraction preceding."

Dr. H. Newell Martin, of Johns Hopkins University, one of America's greatest experimented physiologists, as a result of observations made of the effects of alcohol upon the heart of a dog, says: "Blood containing one-eight per cent of alcohol has no immediate perceptible action on the isolated heart. Blood containing one-fourth per cent by volume almost invariably remarkably diminishes within a minute the work done by the heart: blood containing one-half per cent, that is five parts in a thousand, always diminishes it, and may even bring the amount pumped out of the left ventricle to so small a quantity that it is not sufficient to supply the coronary arteries." This certainly tends to show that in effect the direct action of alcohol upon the heart is paralyzing and not stimulating. Of the nature of the drug, Dr. Samuel Wiks, of London, who is recognized by the medical profession as being one of the highest authorities, says: "Alcohol, for all intents and purposes, may be regarded as a sedative or narcotic rather than a stimulant."

From careful study and observation we learn that the heart never becomes habituated to alcoholic

poison. At every time that an alcoholic drink is taken the heart is excited to an abnormal activity. This abnormal activity is not stimulating and strenthening, but on the contrary exhausts and weakens the heart. After a long and careful study of the subject, Dr. Parkes gives us an estimate of the amount of strain put upon the heart by alcohol. His experiments showed that the extra work done by the heart, when influenced by alcohol, was equivalent to the lifting of 15.8 tons one foot in twenty-four hours. Were it not for the strong muscular tissue of the heart it would soon fail under such over-strain.

We have already learned that some of the alcoholic drinks tend to make some of those persons fleshy who are addicted to the use of them. The fat which such persons acquire is not fat which nature has provided as a result of the use of wholesome and nutritious food, proper exercise, and sufficient repose, but it is "fatty degeneration" that endangers the functional action of the organ. Dr. Joseph C. Hutchinson, of New York, whom we regard as a very high authority, says: "This is destructive or weakening to the muscular power, and when it evinces itself in the heart, it creates a change that is to be dreaded as sapping the strength of the one particular organ that should be strong in drinkers. It attacks them at a vital

spot." The heart enlarges, its muscle becoming soft and flabby. As the "fatty degeneration" goes on the heart loses its power to send the blood through the system, and dropsy follows. At last the heart suddenly fails to act and death ends the suffering of the wretched mortal.

* QUESTIONS.—Among the ancients how was the heart regarded? What has science done in regard to this idea? What are some of the wonderful workings of the heart as revealed by science? What is the work done by the heart in a single day? What is the earliest perceptible effect of a moderate dram of liquor upon the heart? What is the true action of alcohol upon the heart? Does alcohol increase the strength of the heart? How many extra pulsations has a single glass of liquor been shown to produce? How does this activity of the heart affect it? What is the opinion of some of the members of the medical profession in regard to the effect of alcohol upon the heart? Is this opinion correct? Give some of the examples which tend to disprove it? What is the opinion of Dr. Wiks in regard to the effect of alcohol upon the heart? Does the heart ever become habituated to the use of alcohol? Why? Is this abnormal activity stimulating? What is Dr. Parkes' estimation of the extra work done by the heart when influenced by alcohol in a period of twenty-four hours? What is the action of alcohol upon the muscular tissue of the heart? What effect has this "fatty degeneration" upon the power of the heart?

LESSON VIII.

EFFECTS OF ALCOHOL UPON THE CIRCULATORY SYSTEM.

THE BLOOD VESSELS AND THE BLOOD.

Having already learned something of the rapidity of the circulation of the blood you can easily see the necessity of a perfect condition of the arteries, veins, and capillaries. The tissues that compose the walls of the arteries may undergo such a "fatty degeneration" as will necessarily so weaken them as to render them liable to rupture. Apoplexy is a disease caused by the rupture of an artery in the brain, and occurs with the greatest frequency in persons addicted to the use of spirituous liquors.

The walls of the small blood-vessels are kept contracted to a certain size by the action of the tiny nerves, which render them more firm and less liable to become gorged with blood. By the paralyzing effect of alcohol the tiny nerves are rendered powerless, and are no longer enabled to control the walls of the blood-vessel, and as a result they relax and become enlarged. A single dose may only

temporarily paralyze the nerves, but after a continued use of the alcoholic drinks the nerves may become permanently paralyzed, and conjestion of the blood-vessels as seen in the flushed face, red eyes, and red nose of the confirmed drinker is the result. The flushed face, red eyes, and red nose of the drunkard tell an awful tale of misery and woe. Unless there is an immediate halt made the demon is fast dragging the man down to a drunkard's grave. The only hope for such a man is to quit his old associations, quit the use of spirituous drinks, form new associations, take good wholesome diet, and regular out-door exercise.

The blood is the nutritive fluid of the tissues, circulating through the veins and arteries, and constitutes about one-twelfth of the weight of the human body. Says Dr. Foster, "The blood is the great circulating market of the body, in which all the things that are wanted by all the parts, by the muscles, by the brain, by the skin, by the lungs, liver, and kidneys, are bought and sold. What the muscles want it buys from the blood; what it has done with it sells back to the blood; and so with every other organ and part. As long as life lasts this buying and selling is forever going on, and this is why the blood is forever on the move, sweeping restlessly from place to place, bringing to each part the things it wants, and carrying away those

with which it has done." Whenever the blood does not contain the necessary material to supply any particular part that part must suffer. Whenever the blood is so burdened with any material that it can not take the waste matter from the tissues of the various organs the whole body must suffer, and if this condition be continued must as a consequence perish from its own poison.

The blood consists of from one-third to one-half of its weight of corpuscles, and the remainder of plasma. About ninety per cent of this plasma and about fifty-seven per cent of the corpuscles is water. We have already learned that one of the important chemical qualities of alcohol was its great affinity for water. When taken into the blood it readily seizes upon the water. "The alcohol," says Dr. Eli F. Brown, "causes the corpuscles to shrink by reason of a loss of a part of their water, and if much exposed to its action they become swivelled and ragged along the edges." By this action of alcohol upon the corpuscles they are so disabled that they cannot perform their functions of carrying oxygen from the lungs to the tissues, and thus oxydation is greatly hindered throughout the whole body. It also interferes with the "ripening" of the crude materials derived from the food and hinders the elimination of the carbonic acid and nitrogenous wastes from the tissues. "Alcohol," says Virchow,

"poisons the blood, arrests the development of the corpuscles, and hastens their decay."

If very strong alcohol be introduced into the blood coagulation at once takes place, clogging the blood-vessels and immediately interrupts the circulation. If the alcohol be very much diluted, as in the case of the alcoholic beverages, and continually taken for any considerable length of time, it so materially changes the blood as to render it powerless of coagulation. The surgeons tell us that in the case of persons who are in the habit of using spirituous liquors, the wounds do not heal as readily as they do in the case of the total abstainer. There is great danger from bleeding in such cases. And also inflammation of the injured part is most likely to occur.

QUESTIONS.—Why should the arteries, veins, and capillaries be kept in perfect condition? What condition renders them liable to rupture? By this condition what disease is caused? By what action are the walls of the small blood-vessels kept contracted? What effect has alcohol upon these nerves?

What is the blood? What does Dr. Foster say of it? What is the result when the blood fails to furnish the necessary supply or bear away the waste matter from any part of the body? What percents of the different parts of the blood are water? Why does this render the blood liable to injury from alcohol? What is said by Dr. Eli F. Brown? How does this effect the work to be performed by the blood?

What does Virchow say? What is the effect of introducing strong alcohol into the blood? What is the effect upon the blood of the continued use of diluted alcoholic beverages?

LESSON IX.

EFFECTS OF ALCOHOL UPON RESPIRATION.

The chief organs of respiration are the lungs, trachea, larynx, and nasal passages. These are very delicate organs and of very special importance in the economy of life. The object of the function of respiration is to provide a sufficient and continuous supply of oxygen to the blood, and to eliminate the carbonic acid that is formed by the oxydizing process that is continually going on in the tissues of the healthy organs of the body. "Every time you breathe," says Rev. Charles Kingsley, "you breathe two different breaths: you take in one and give out another. The composition of those two breaths is different. Their effects are different. The breath which has been breathed out must not be breathed in again. To tell you why it must not would lead me into anatomical details not quite in place here as yet; but this I may say: those who habitually take in fresh breath will probably grow up large, strong, ruddy, cheerful, active, clear-headed—fit for their work. Those who habitually

take in the breath which has been breathed out by themselves, or any other living creature, will certainly grow up—if they grow up at all—small, weak, pale, nervous, depressed, unfit for work, and tempted continually to resort to stimulants and become drunkards."

By the act of respiration, the blood, laden with impurities and of a dark brown color, gives off its carbon dioxide, and receives oxygen from the air, giving to it a bright red color and a new life giving vigor.

One of the earliest perceptible effects of alcohol upon the respiration when wine or other spirituous drink is taken, is the peculiar offensive odor which it imparts to the breath in a very few minutes after the draught is taken. By experiment some authorities say that it is given off through the lungs within a few seconds from the time the dram is taken into the stomach. Alcohol when taken into the stomach is rapidly absorbed and passes through the blood to the lungs where it is partially expelled from the system in the form of the vapor of alcohol. The length of time which this condition lasts depends upon the quantity of liquor taken. This condition shows that the lungs are compelled to do an increased amount of labor in the effort to rid the system of this poisonous drug. As long as the exhalation of the vapor of alcohol continues the

respiration is imperfect, an insufficient amount of oxygen is taken in at each inhalation, and the quantity of carbonic acid thrown off is greatly diminished.

This is not the only injury the lungs suffer, for they are materially weakened by the destructive action of the alcoholic poison upon the tissues. This is similar to the "fatty degeneration" of the other organs. Wheezy breathing and hoarseness of the voice are frequently noticeable among habitual drinkers. Dr. A. B. Palmer says, "an irritated and inflamed condition of the throat, often extending to the tubes of the lungs, producing a hoarseness and a husky cough, especially in the morning, is a common occurrence in free drinkers."

By the distension of the capillaries of the lungs under the narcotizing influence of alcohol, they are kept continually over-filled with blood. This renders them liable to the attacks and ravages of the various diseases of the lungs. In their weakened condition, they are much less able to throw off the disease and death more frequently results.

Within recent years medical writers have recognized an intensely fatal disease known as alcoholic consumption.

There is a great difference of opinion in the medical profession as to the effect of alcohol in cases of pulmonary tuburculosis (or consumption),

but the weight of authority seems to be against its use. Dr. N. S. Davis, of Chicago, who has devoted years to the study of the subject, says, "after an experience of over fifty years, I still believe that there is no form of alcoholic drink either necessary or desirable for internal use either in health or in the various forms of disease; but health can be better preserved and disease better treated without any use of such drink."

QUESTIONS.—What are the chief organs of respiration? What is the character of these organs? What is the object of the function of respiration? What does Rev. Charles Kingsley say about respiration? By the act of respiration what changes take place in the blood? What is one of the earliest perceptible effects of alcohol upon respiration? How does this occur so quickly? How is this injurious to the lungs and respiration? Do the lungs suffer any other injury besides being over worked? What symptoms are frequently noticeable among habitual drinkers? What injury is stated by Dr. Palmer? What effect has alcohol upon the blood-vessels of the lungs? How does this injure the lungs? What disease of the lungs has been recognized within recent years? What is the opinion of the use of alcohol in the treatment of tuburculosis? What does Dr. Davis say of its use?

LESSON X.

EFFECTS OF ALCOHOL UPON THE KIDNEYS.

The kidneys are two dark red, bean shaped organs situated within the abdominal cavity and on either side of the spinal column. Their office is the purification of the blood. The kidneys continue right on steadily filtering from the blood poisonous waste materials. If they are in any way clogged or fail to do their work the individual is soon thrown into convulsions and dies from the effects of the poisoning. The first noticeable effect of alcohol upon the kidneys when a drink of intoxicating liquor is taken, is the production of more or less irritation, which depends upon the amount of alcohol taken. The blood-vessels of the organs are dilated, containing an abnormal quantity of blood. This action of the alcohol temporarily increases the secretion. Not infrequently does a "spree" or fit of drunkenness and exposure result in an attack of acute inflammation of the kidneys. Such inflammation may be attended with an impairment of the structure of the organs, which may

be followed by general dropsy or even convulsions and death.

The long continued use of alcoholic beverages may result in such a degeneration of the tissues as renders the organs incapable of separating the impurities from the blood. In some cases there is an enlargement of the organ, but in a majority of cases they are shrunken and become much smaller than their normal size. When such conditions follow the long and continued use of spirituous liquors, not infrequently there is general oedema and dropsy. This is the much dreaded Bright's disease.

QUESTIONS.— Describe the kidneys? What is their office? What is the result in any obstruction or hinderance in their work? What is the first noticeable effect of alcohol upon the kidneys? What frequently follows a "spree" or fit of drunkenness? How may this finally terminate? What may be the result of long continued use of alcohol beverages? What dreaded disease may be produced by the degeneration of the tissues of the kidneys?

LESSON XI.

EFFECTS OF ALCOHOL UPON THE NERVOUS SYSTEM.

The effects of alcohol upon the nervous system must necessarily be considered from different points of view. We must remember that the nervous system has intricate relations with every other organ and part of the body. The muscles, stomach, heart and lungs have no power of themselves to perform their important functions in the economy of life, but are dependent upon the nervous system for the power to perform their every act. Then, too, we find that the brain, the chief organ of the nervous system, is the seat of the mind.

The nerve tissue is the most delicate substance to be found in the human body. Nerve matter, a soft pulpy substance, is three-fourths water. Owing to its great affinity for water, alcohol, when taken, very naturally makes a severe attack upon the nervous matter of the body. When alcohol in any form is taken continuously, it impairs the nutrition of the nerve-centres. By each successive indulgence the abnormal nutrition is increased and the demand

for alcoholics strengthened. As a result of impaired cell-nutrition mental derangement follows, as well as perverted organic and muscular action.

In cases of post mortem examination of the different tissues of the body of a person who has died from the effects of alcohol, by chemical analysis it is shown that there is more alcohol in the nerve-centres and the nerves than in any of the other tissues.

When small doses of alcohol are taken at long intervals no serious changes appear in the brain other than an increased supply of blood. It is markedly different when large doses are habitually taken; the brain matter becomes harder and tougher than is natural. Serious changes are seen in the wasting away of nerve cells. As the nerve matter becomes shrunken, the cavities are filled with a watery fluid, and the brain action vitally impaired. In cases of long and continued debauches, the blood-vessels of the brain are weakened and diseased, and sometimes in this condition they are ruptured, producing apoplexy and death.

Dr. W. S. Greenfield says, "another condition is trembling due to alcohol. The hands are shaky, or unsteady, even when at rest, or if the hand is held out it is seen to vibrate slightly, or in more advanced condition, 'shakes like an aspen leaf.' I have seen this in a spirit-drinker, a barber, as

almost the only symptom: he worked night and day in shaving, and to 'steady his hand' partook repeatedly of spirits—at first to relieve fatigue and then, because he saw that if he discontinued, his hand was too shaky to use the razor. Complete abstinence from alcohol quite removed his tremblings and his desire for spirits."

Frequently paralysis of different organs are caused by the action of alcohol upon the nerves. Alcohol is a powerful narcotic, and in the study of the nervous system we see its effects most fully demonstrated.

QUESTIONS.—What essential fact should be remembered in the study of the effects of alcohol upon the nervous system? What is the chief organ of the nervous system? What organ is the seat of the mind? What is the most delicate substance in the body? What portion of the nerve matter is water? Why does alcohol especially attack the nervous matter? How does alcohol attack the nerve-centres? What follows an impairment of the nerve-centres? What is shown by chemical analysis in cases of post mortem examinations? Describe the various actions of alcohol upon the brain? What does Dr. Greenfield say of its action on the nervous system? Why does alcohol frequently produce paralysis?

LESSON XII.

EFFECTS OF ALCOHOL UPON THE MIND.

As previously stated, the brain is the seat of the mind. Any inflammation, congestion, or diseased condition, is liable to derange the mind either temporarily or permanently. Every single intoxication is a temporarily deranged condition of the mind. "A frequent effect of alcoholism," says Dr. Magnus Huss, "is partial or total atrophy of the brain; the organ is reduced in volume, so that it no longer fills the bony case. The consequence is a mental degeneration, which in the progeny results in lunatics and idiots." The use of alcoholics is within the sphere of voluntary action; the effect it produces is wholly beyond this sphere. The acquisition of an appetite is not necessarily so much the result of an act of the *will* as it is the result of a physiological action. The person who begins the use of spirituous beverages seldom if ever *intends* to acquire adominating appetite. He is usually astonished, when he awakes to the fact that he is in bondage to it.

While the intricate relation of the mind and the nervous system may remain without full explanation and complete comprehension, yet, the results produced upon the mind by the intemperate use of alcohol can easily be perceived. In case of temporary insanity produced by the use of alcoholics, a bewilderment of the perceptive faculties, failure in the retentive powers of the memory, and a delusive imagination are plainly observed. Each debauch is followed by nervousness and sleeplessness. Later the stronger faculties of the *will*, the reason and judgment yield to the terrible onslaught of the demon, and the man becomes a maniac.

"The worst estate of man is that wherein he loses the knowledge and government of himself." Man in this condition is a most pitiable object. In his despair he is liable to commit the most irrational acts. His moral senses are benumbed. "All delicacy, courtesy, and self-respect are gone; the sense of justice and of right is faint or quite extinct; there is no vice into which the victim of drunkenness does not easily slide, and no crime from which he can be expected to refrain."

Many young men of high intellectual capacities and noble qualities have partook of the fatal cup, and, their lives ship-wrecked, they pass down to the grave in ruin and despair. Dr. J. R. Black, in

his Ten Laws of Health, says: "It is a truth of the greatest moment, which ought to be so impressed upon the mind as to be always rising up within it, that *transgressions of the laws of health, not punished at one end of life, are sure to be at the other.*"

QUESTIONS.—How is the mind affected by inflamation, congestion, etc., of the brain? What does Dr. Magnus Huss say of the effect of alcoholism? Is the use of alcohol within the sphere of voluntary action? Is the effect? Is the acquisition of the drink habit an act of the *will*? What is it the result of? What are some of the noticeable effects upon the mind in temporary insanity? Each debauch is followed by what? Later on what faculties are dethroned? What is said of the effect upon the moral senses? What principal is laid down by J. R. Black in his Ten Laws of Health?

LESSON XIII.

THE HEREDITARY EFFECTS OF ALCOHOL.

It is one of the fixed laws of nature that the offspring of every living thing is to all intents and purposes like its parents. As it is true in the plant world so it is in the animal world. When a certain kind of grain of a known quality is planted, we naturally expect it to produce the same kind of grain of the same quality. If the conditions and circumstances surrounding its growth are suitable we shall be able to reap such as we have sown. It is equally true in the rearing of children. Children very largely inherit the dispositions and physical features of their parents. If the parents be strong physically and mentally the children are most likely to be strong both physically and mentally. If the parents be profoundly diseased, or affected by some constitutional weakness, the children are most likely to inherit a deep-seated predisposition to the disease or constitutional weakness. If the parents are intemperate, the children have a strong predisposition to intemperance.

Dr. Yellowlees, Medical Superintendent of the Glamorgan County Asylum, England, says: "With the single exception of hereditary predisposition, intemperance is, by far, the most fruitful of all the causes of brain disease, and even hereditary predisposition is often but another name for parental intemperance."

We are inclined to the opinion that there is much attributed to hereditary intemperance that has its origin in an entirely different source. We shall give a few extracts from the opinions of medical men on the use of alcoholics in the medical treatment of children from infancy.

Professor Von Struempell, says: "I am of the opinion that the habit of drink is acquired rather than hereditary. The majority of cases that have come under my observation proved this to my satisfaction."

Dr. Moreau Morris, superintendent of the New York Summer Corps of Physicians, says: "I learned that the majority of drunkards whom I have under my care in the former State Inebriate Home acquired the taste for whisky in the cradle. With these all efforts of reform were idle. The craving for liquor had permeated their whole physical and mental system, I found, and could not be eradicated."

Professor Demme, rector of the University of Berne, says: "The natural course of events following the administering of alcohol to children shows that it is a mistake, if not a crime; the little ones absorb it rapidly, and it produces intoxication, which is a sign of weakness and non-toleration. As superintendent of a children's hospital in this city I have observed that catarrh of the stomach and bowels followed in the wake of milk punches given to children, even if only a few drops of cognac had been added to their milk."

Dr. Augustus Forel, of Berlin, says: "The child's brain is the finest organism that can be imagined; everything that tends to disturb that organism interferes with its development; it stops the development of the will, of intelligence, and of ethical and aesthetic qualities in the growing child. It is criminal to give children wine and beer; to dose them with whisky should be made a punishable offense. To rear lazy, nervous, irritable children is bad enough, but to educate one's offspring to become a drunkard or a morphenist constitutes a crime against society. And that is what hundreds of thousands of parents are doing."

QUESTIONS.—What law of nature exists in regard to offspring? In what do children resemble their parents? What is the result if parents are intemperate? What does Dr. Yellowlee say on this subject? What is another source of the drink habit?

LESSION XIV.

COMMON BEVERAGES.

TEA.

Tea is used more extensively by peoples whose food consists very largely of carbo-hydrates—as the Chinese and Japanese. Tea, as a beverage, is prepared by pouring hot water upon the dried leaves of the tea plant. The active principle of tea is *theine.* This substance is represented by the formula $C_8 H_{10} N_4 O_2$. Upon chemical analysis commercial tea is found to contain (1) a volatile or essential oil; (2) theine; (3) a nitrogenous compound analogous to caseine or gluten; (4) a modification of tannin; besides fat, gum, starch, sugar, salts, woody fibre, etc. The excessive use of tea will cause sleeplessness and other nervous symptoms. As a general rule tea is injurious to young children, and to persons of weak constitutions, and irritable temperament.

Much has been said and written about its dietetic and medicinal use. By the use of tea the pulse is slightly quickened; the action of the skin increased; and that of the bowels lessened. It has

been proven by experience that tea sustains the system without causing subsequent exhaustion and collapse. During his arctic expedition Dr. Kane made careful observations of its effects, and says: "After repeated trials, the men who took most kindly to coffee in the morning, and tea in evening. The coffee seemed to continue its influence through the day, and they seemed to grow hungry less rapidly than after drinking tea, while tea soothed them after a day's hard labor, and the better enabled them to sleep. They both operated upon fatigued men like a charm, and their superiority over alcoholic stimulants was very decided."

Dr. Parkes regards it as a very useful article of diet for soldiers. Observation show that cold tea is very acceptable to reapers and others engaged in laborious work in hot weather. One writer, says: "Old and infirm persons usually derive more benefit and personal comfort from tea than from any other beverage of its class." In some cases of irregular heart action tea acts as a useful sedative, in other cases it may prove positively injurious.

Eminent authorities tell us that it is markedly injurious to digestion.

It sometimes proves a useful antidote to opium poisoning.

COFFEE.

Coffee has a very similar effect upon the user to that of tea. The active principle in coffee is the alkaloid *caffeine.* Coffee when used moderately is said to be beneficial to persons of adult age. The coffee bean is the part of the coffee plant used in the preparation of the beverage. Coffee owes its exhilarating and refreshing properties to the presence of three substances: (1) caffeine, (2) a volatile oil, (3) an astringent acid, resembling tannic acid, but designated caffeic acid or caffeo-tannic acid. Coffee is most useful in allaying the sensation of hunger; in diminishing the amount of waste of the tissues of the body; and in refreshing the weary and fatigued.

"The effects of coffee," says an eminent authority, "are such as to raise the action of the nervous and vascular systems, and at the same time to arrest the decomposition of tissue. Its stimulating effects and protraction of metamorphic destruction of tissue are due to the active principle *caffeine*, and the essential oils of the beans. Caffeine in excessive quantities produces rigors, derangement of the urinary organs, and a peculiar inebriation and delirium."

Another very eminent authority says: "In the use of tea and coffee we get the chief cause of the

greater prevalence of the nervous diathesis, soured and pevish nature, and incompatability. Here, too, we see the parentage of organic headache, gastralgia, functional and organic heart disease, the continued fear and fact of paralysis so frequently met with, and the inception of the tobacco and major appetites."

TABLE.

COMPOSITION OF GREEN COFFEE.

Caffeine	0.8 per cent.
Legumine (vegetable cassine)	13.0 per cent.
Gum and sugar	15.5 per cent.
Caffeo-tannic acid	5.0 per cent.
Fat and volatile oil	13.0 per cent.
Woody fibre	34.0 per cent.
Ash	6.7 per cent.
Water	12.0 per cent.
	100.0 per cent.

COCOA.

Cocoa contains a considerable amount of fat and proteid substances, but when compared with milk it is found much inferior as a food. It is an excellent substitute for tea and coffee, and is a valuable drink for adults under circumstances requiring extra exertion.

QUESTIONS.—What class of people most extensively use tea as a beverage? How is tea prepared? What is the active principle? What is the chemical formula? Upon chemical analysis commercial tea is found to contain what substances? As a general rule tea is injurious to what class of persons? What noticable effect has tea upon the organs of the body? What is said by Dr. Kane of its use? How is it regarded by Dr. Parkes?

How does coffee compare with tea in its effects? What is the active principle in coffee? What part of the coffee plant is used in preparation of the beverage? To what substances does coffee owe its exhilarating and refreshing properties? For what purposes is coffee most useful? What is said by some authorities of its effects? What is said about cocoa?

LESSON XV.

TOBACCO.

Tobacco is a highly narcotic and poisonous plant; a native of America, but now grown in almost all parts of the world. When cultivated the plants grow from five to six feet high, erect, lanceolate, sessile leaves, six to eighteen inches long, and rose-colored flowers.

Columbus found smoking one of the practices of the natives of the West Indies. This practice has been prevalent from unknown antiquity among the American Indians as far north as Canada. Tobacco culture was introduced into Europe by Gonzalo Hernandez de Oviedo. It was at first cultivated as an ornamental plant. Shakespeare makes no reference to the use of tobacco, though it was well known in England in his time. Popes Urban VIII. and Innocent XI. thundered the powers of the church against it. The priests and sultans of Turkey denounced smoking as a crime. Amuret IV., Sultan of Turkey, decreed its punishment by the most cruel death. In the earlier part of the 17th century, the Czar of Russia

ordered that the noses of smokers be cut off. In England, James I. issued a *Counterblaste to Tobacco*, in which he says, its use is "a custom loathsome to the eyes, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black, stinking fume thereof nearest resembling the horrible stygian smoke of the pit that is bottomless." All opposition proved in vain, for its use became wide-spread.

The most important active principle in tobacco is *nicotine*, which in its pure form is a powerful poison. Two drops of this powerful drug will cause speedy death in any person not habituated to the use of tobacco, and a single drop is sufficient to kill a rabbit in three and a half minutes.

Dr. H. C. Wood, one of the best modern authorities, says: "Upon those persons who are not habituated to its use, tobacco acts as a very powerful depressant, producing horrible nausea and vomiting, with giddiness and a feeling of intense wretchedness and weakness. If the amount taken has been large, to these symptoms are added burning pain in the stomach, purging, * * * extreme giddiness passing into delirium, a rapid, running, and finally imperceptible pulse, cramps in the limbs, absolute loss of muscular strength, a cold, clammy skin, and finally complete collapse, terminating in death."

The effects produced by the use of tobacco as commonly employed, either by smoking or chewing, are of two classes, acute and chronic. The primary or acute symptoms are those usually experienced by novices on their first indulgence in the weed.

They consist of faintness, nausea, giddiness, vomiting, trembling, coldness of the extremities, a clammy sweat, loss of power in the limbs, and general muscular and nervous prostration.

These effects, however, soon pass off, and if the learner foolishly persists in the use of the poison he soon becomes habituated to its action, and instead of suffering as at first from its use, he experiences a sense of depression when not under its influence, is cross, fretful and irritable when long deprived of it, and has a continual craving which leads him to habitual indulgence, thus preparing the way for the second class of symptoms, the secondary or chronic effects. These are of a much more serious and permanent nature, and are not usually experienced to any marked degree until the victim has smoked or chewed to a considerable extent for ten years or more.

We have thus far traced the early history and general effects of the use of tobacco. We shall now take up the study of its effects upon the different organs and parts of the body.

The use of tobacco by children prevents the proper nutrition and growth of the bones, thus rendering them weak and liable to injury and deformity.

The use of tobacco by young persons and even older persons produces weakened muscular power, attended with irregular action. The skin of young cigarette-smokers often becomes unhealthy and of a sallow hue.

Tobacco can in no sense be considered as a food, and is injurious to digestion. When used in chewing or smoking it excites the salivary glands, causing an increased flow of saliva. In their overworked condition the salivary glands no longer secrete healthy saliva, but a watery fluid deprived of much of its property of converting starch into sugar. This frequently greatly inpairs digestion. "Physicians," says Dr. Mussey, "meet with thousands of cases of *dyspepsia* connected with the use of tobacco in some one of its forms."

The use of tobacco may produce an irregular heart-action, an exaggerated kind of palpitation, heart-"fluttering," or in some cases the heart-beat may become greatly weakened by the tobacco poisoning. This is known to physicians as the "tobacco-heart."

The excessive use of tobacco can be clearly demonstrated by the examination of a properly

spread slide of blood. In such cases red corpuscles will be found to be crenated: that is, the corpuscle, instead of possessing the absolute regularity of margin noticed in health, will present a series of scallops somewhat irregular in their distribution. A few such crenated corpuscles, in the proportion of one to three hundred and fifty occur in normal health, but in tobacco blood the ratio is often as high as one to ten, and sometimes attains a much larger proportion. Where the patient is otherwise healthy a number of crenated corpuscles in his blood may safely be ascribed to the excessive use of tobacco, opium or some narcotic, and it is then necessary to stop their use.

The use of tobacco is especially injurious to the throat and lungs. It causes the throat to become dry and irritated. The voice becomes husky from the irritant action of the poison. Often a dry, hacking cough is produced by its irritation of the membrane lining the larynx and bronchial tubes. Habitual smokers usually suffer, after a time, from what is known to the medical profession as the "smoker's sore-throat."

The effect of tobacco upon the nervous system is that of modifying the energies and not the structure. "On the youthful and the immature," says Dr. Cutter, "the effects of tobacco, in what form soever taken, are pernicious. The processes

of nutrition are diminished and the growth stunted; the innervation of the heart is disturbed; its action becomes weak, irregular, and intermittent, causing palpitation, faintness, and dizziness; muscular co-ordination is impaired, for it is said that youthful smokers cannot draw a "clean straight line." Certain glands, at first, are stimulated, especially by cigarette-smoking, but later becomes markedly debilitated; the power of concentration of mind is lessened, the intellectual activity is said to be impaired, and the whole individual is crippled. Tobacco is a bane to the youth of the world. No boy from ten to fifteen years old can practice smoking or chewing the weed without becomimg mentally and physically less efficient when he reaches his majority than he otherwise would have been."

By chewing and smoking tobacco the sensibility of the nerves of the tongue and palate may be lessened to such a degree as to greatly impair the sense of taste. In cases of the "smoker's sore-throat" the inflammation may extend to the Eustachian tubes, and the middle ear greatly injured if not destroying the sense of hearing.

A New York specialist, says: "The greatest enemy to the eyes of young men is the cigarette. Recently a disease has appeared among smokers which is dangerous, and after careful investigation,

the best authorities, who for a long time were at a loss to understand the peculiar malady, have traced it to the small, paper-covered tobacco sticks. It is now known as the cigarette eye, and can be cured only by long treatment. Its symptoms are dimness and filmlike gatherings over the eye, which appear and disappear at intervals."

QUESTIONS.—What is tobacco? What is said of its growth? Tell about its early history? What is the most important active principle? What is said of the power of this drug? What does Dr. Wood say of the effect of tobacco upon persons not accustomed to its use? What two classes of effects are produced by the smoking or chewing of tobacco? What are the primary or acute symptoms? When do the secondary or chronic effects occur? What is the effect of tobacco upon the bones? Upon the muscles? Upon the skin? Is tobacco a food? How does it injure digestion? What is said by Dr. Mussy? What effect may it have upon the heart? What upon the blood? What upon the throat? Upon the nervous system? What is said by Dr. Cutter? How does it effect the sense of taste? The sense of hearing? What effect does smoking have upon the eyes?

APPENDIX.

THE EFFECT OF THE USE OF ALCOHOL IN THE COMMISSION OF CRIME.

Every sane man is responsible for his personal acts. He possesses a knowledge of right and wrong. When man's higher nature is depraved, his senses of morality and self-respect benumbed, he is in a condition to commit the most atrocious crime. This state of mind in which man wilfully, purposely and premeditatedly commits a crime is not always the direct effect of alcohol. While statistics show that a large majority of the inmates of prisons have been drunkards, yet it does not show that the direct result of intoxication led to the commission of crime. The general impression that alcohol is used to create nerve vigor, and give power to commit criminal acts, is only true in a limited sense. Many crimes that are supposed to have been committed by persons who wilfully used spirits for this special purpose, are most commonly found to have been stimulated and provoked by other causes.

The blurred mental state from the first stage of the action of alcohol on the brain is of short duration and quickly merges into an aesthetic physical and mental state; when courage fails and fear and suspicion become prominent.

We quote from R. G. Ingersoll, as to the general aptitude of the use of alcohol in the commission of crime:

"I am aware there is a prejudice against any man engaged in the manufacture of alcohol. I believe from the time it issues from the coiled and poisonous worm in the distillery until it empties into the hell of death, that it is demoralizing to everybody that touches it, from the source to where it

ends. I do not believe that anybody can contemplate the the subject without being prejudiced against the crime. All they have to do is to think of the wrecks on either side of the stream of death, of the suicides, of the insanity, of the poverty, of the destruction, of the little children tugging at the breast of weeping and despairing wives asking for bread, of the man struggling with imaginary serpents produced by this devilish thing; and when you think of the jail, of the almshouses, of the asylums, of the prisons, and of the scaffolds, on either bank, I do not wonder that every thoughtful man is prejudiced against this vile stuff called alcohol.

Intemperance cuts down youth in its vigor, manhood in its strength, and age in its weakness. It breaks the father's heart, bereaves the doting mother, extinguishes natural affection, erases conjugal love, blots out filial attachment, blights parental hope, and brings down mourning age in sorrow to the grave. It produces weakness, not strength; sickness, not health; death, not life. It makes wives widows, children orphans, fathers fiends, and all of them paupers and beggars. It feeds rheumatism, nurses gout, welcomes epidemics, invites cholera, imports pestilence, and embraces consumption. It covers the land with idleness, poverity, disease and crime. It fills your jails, supplies your almshouses, and demands your asylums. It engenders controversies, fosters quarrels, and cherishes riots. It crowds your penitentiaries, and furnishes the victims for your scaffolds. It is the life-blood of the gambler, the ailment of the counterfeiter, the prop of the highwayman, and the support of the midnight incendiary. It countenances the liar, respects the thief, and esteems the blasphemer. It violates obligation, reverences fraud and honors infamy. It defames benevolence, hates love, scorns virtue and slanders innocence. It incites the father to butcher his helpless offspring, helps

the husband to massacre his wife, and aids the child to grind the parricidal ax. It burns up man and consumes woman, detests life, curses God, and despises heaven. It suborns witnesses, nurses perjury, defiles the jury-box, and stains the judicial ermine. It bribes voters, disqualifies votes, corrupts elections, pollutes our institutions, and endangers our government. It degrades the citizen, debases the legislator, dishonors the statesman, and disarms the patriot. It brings shame, not honor; terror, not safety; despair, not hope; misery, not happiness. And with the malevolence of a fiend it calmly surveys its frightful desolations, and, insatiated with havoc, it poisons felicity, kills peace, ruins morals, blights confidence, slays reputation, and wipes out national honor, then curses the world and laughs at its ruin.

It does all that and more. *It murders the soul.* It is the sum of all villanies, the father of crimes, the mother of all abominations, the curse of curses, the devil's best friend, and God's worst enemy."

QUOTATIONS FROM SCIENTIFIC AUTHORITIES ON THE EFFECTS OF ALCOHOL.

Dr. Willard Parker, one of the most eminent physicians this country has produced, says: "Alcohol is an irritant poison, having no place in a healthy system."

Dr. William Pepper, President of the University of Pennsylvania, an author and physician of very wide reputation, says: "The *habitual* use of alcoholic drinks by healthy persons is highly injurious, and involves the risk of developing serious disease."

Dr. T. Lander Brunton, says: "The skin is at first soft, with a soft satiny feeling, from which I have seen Prof. Neumann (Vienna) discover the alcoholic tendencies of the patient; and perspiration is easily induced. Later on, the skin becomes thick and discolored, sometimes red and sometimes sallow, and becomes liable to various diseases, the best known of which is acne rosacea, often called 'bottle-nose.' Besides this, the skin may be affected with inflammation of various sorts, leading to the formation of ulcers, vesicular, scaly, or pustular eruptions, boils and abcesses."

Dr. John V. Shoemaker, in his Treatise on Diseases of the Skin, says: "The *habitual* use of vinous, spirituous and malt liquors is also a common source of the disease [rosacea]. The powerful action of these liquors in producing increased facial circulation, leading to a hideous swollen condition of the nose, can be observed daily. These deformities are commonly known as 'grog-blossoms,' 'brandy-nose,' and 'wine-nose.'"

Dr. Austin Flint, Jr., of Bellevue Hospital Medical College of New York, says: "Alcohol notably diminishes the exhalation of carbonic acid and the discharge of the excrementitious principles, particularly urea. It diminishes the activity of nutrition, and if long continued, the assimilative power of the system becomes so weakened that the proper quantity of food cannot be appropriated, and alcohol is craved to supply a self-generated want. The organism may in many instances be restored to its physiological condition by discontinuing the use of alcohol. * * * These effects are too well known to the physician, especially in hospital practice, to need farther comment. * * * It is not proved that alcohol enables men to endure a very low temperature for a great length of time. This end can be accomplished only by an increased quantity of food."

Dr. J. M. Fothergill, says: "Many cases of dyspepsia are due to alcohol solely and wholly, and no reliance whatever can be placed upon the word, statement, or assertion under oath of a drunkard; for 'a drunkard is a liar.' And this holds good of both sexes, all ages, everywhere and ever."

"By direct contact, alcohol acts upon the stomach and leads to a destruction of its secreting tubules. Nothing with such certainty impairs the appetite and the digestive power as the continued use of strong alcoholic liquids. From the stomach it is absorbed, and with its distribution through the system it interferes with nutrition and leads to a diseased state of the liver, kidneys, and other organs" —*Pavy.*

Dr. Sir Wm. Roberts says: "The *distilled spirits*—brandy, whiskey and gin—were found to have but a trifling retarding effect on the digestive processes, whether salivary or peptic, in the proportions in which they are commonly used dietetically. Their obstructive effects only become apparent

when used in quantities which approach intemperance. * * * *Wine and malt liquors* exhibit an action differing considerably from that of ardent spirits. Wines were found to be highly inimical to salivary digestion. Even very small quantities of sherry, claret, hock, or champagne, inhibited the action of saliva on starch to a very high degree. This is due to the considerable acidity which all wines possess. On peptic digestion, wines exhibit a retarding effect altogether out of proportion to the alcohol contained in them. Both the stronger and lighter wines, except in very moderate proportions, checked the speed of the peptic digestion."

In Flint's Physiology it is said: "Alcohol is capable of being absorbed and taken into the blood, but that it passes out again unchanged. It cannot be regarded as an ailment, and hence cannot take the place of articles that are assimilated."

Dr. Buchner says: "*Beer*, when undiluted, stops the process of artificial digestion entirely; diluted with water it simply hinders it. In the natural process of digestion, beer appears to act unfavorably even when taken in small amounts; wine acts in the same way."

Dr. A. C. Rembaugh, a prominent physician of Philadelphia, says: "I have no use for alcohol as a food, drink, or medicine, and I believe it is never used, in large or small quantities, without absolute harm to the one partaking of it."

Dr. Hayes, the Arctic explorer, wrote, "In Arctic countries alcohol is, in almost any shape, not only completely useless, but positively injurious."

Dr. Wm. B. Carpenter, Examiner in Physiology and comparative Anatomy in the University of London, says: "The use of alcohol in combination with water and with

organic and saline compounds in the various forms of fermented liquors, deserves particular notice, on account of the numerous fallacies which are in vogue respecting it. In the *first* place, it may be safely affirmed that alcohol cannot answer any one of those important purposes for which the use of water is required in the system; and that, on the other hand, it tends to antagonize many of those purposes, by its power of precipitating most of the organic compounds, where solution in water is essential to their appropriation by the living body. *Secondly*, the ingestion of alcoholic liquors cannot supply any thing which is essential to the due nutrition of the system; since we find not only individuals, but whole nations, maintaining the highest vigor and activity, both of body and of mind, without even employing them as an article of diet. *Thirdly*, there is no reason to believe that alcohol, in any of its forms, can be directly subservient to the nutrition of the tissues, for it may be certainly affirmed that, in common with non-azotized substances in general, it is incapable of transformation into albuminous compounds; and there is no sufficient evidence that even fatty matter can be generated in the body at its expense. It is quite true that some persons who consume large quantities of fermented liquors become very fat; but the material for this fat is probably derived in part from the disintegration of the tissues; the hydro carbonaceous matter in the system being prevented from undergoing the combustive process to which it would otherwise be subject, by the superior affinity for oxygen, which alcohol possesses. Much of the fatty deposit in intemperate persons has the character of fatty degeneration; the tendency to which is very marked in persons of this class. *Fourthly*, the alimentary value of alcohol consists merely in its power of contributing to the production of heat, by affording a pabulum for

the respiratory process; but for this purpose it would be pronounced on chemical grounds to be inferior to fat; and the results of the experience of Arctic voyagers and travelers is most decided in regard to the comparative low value of alcohol as a heat producing material. *Fifthly*, the operation of alcohol upon the living body is essentially that of a stimulant, increasing for a time, like other stimuli, the vital activity, and especially that of nervo-muscular apparatus, so that a greater effort may often be produced in a given time under its use, than can be obtained without it, but being followed by a corresponding depression of power, in proportion as the previous excitement has been greater or less. Nothing therefore is in the end gained by its use, which is only justifiable where some temporary emergencies can only be met by a temporary augmentation of power, even at the expense of an increased amount of subsequent depression; or where it affords aid in the introduction of ailment into the system which nothing else can so well supply. These exceptional cases, however, will be less numerous, in proportion as due attention is paid to those other means of promoting health, which are more in accordance with nature."

Dr. W. B. Carpenter states further: "The physiological objections to the habitual use of even small quantities of alcoholic liquors, rest upon the following grounds: *First*, they are universally admitted to possess a poisonous character, when administered in large doses; death being the speedy result, through the suspension of nervous power, which their introduction into the circulation in sufficient quantity is certain to induce. *Secondly*, when habitually used in excessive quantities, universal experience shows that alcoholic liquors tend to induce a morbid condition of the body at large, and especially of the nervous system. * * * *Thirdly*, the

frequent occurrence of chronic diseases of the same character, among persons advanced in life, who have habitually made use of alcoholic liquors in 'moderate' quantities, affords a *strong probability* that they result from a gradual perversion of the nutritive processes, of which that habit is the cause. This perversion manifests itself particularly in the tendency to 'fatty degeneration' of the muscular substance of the heart, of the walls of the arteries, of the glandular substance of the kidneys and liver, and many other parts; and this gives rise to a great variety of forms of disease. * * * *Fourthly*, the special liability of the intemperate to zymotic diseases, seems an indication that the habitual ingestion of alcoholic liquors tends to prevent the due elimination of the azotized products of the disintegration of the system, and thus to induce a fermentable condition of the blood. *Fifthly*, extended experience has shown that notwithstanding the temporary augmentation of power which may result from the occasional use of fermented liquors, the capacity for prolonged endurance of mental or bodily labor, and for resisting the extremes of heat and cold, as well as other depressing agencies, is diminished rather than increased by their habitual employment. On these grounds the author has felt himself fully justified in the conclusion, that, for physiological reasons alone, habitual abstinence from alcohol liquors is the best rule that can be laid down for the great majority of healthy individuals; the exceptional cases in which any real benefit can be derived from their use, being extremely few.

"The mean amount of alcohol in fresh bread (yeast) is .313 per cent—that is, a pound of bread would yield, if very carefully distilled, about twenty-two grains (considerably less than a teaspoonful). As the bread gets staler the quantity disappears."—*A. W. Blyth, M. D.*

Dr. Robert Bartholow says: "At present the weight of authority and the deductions of experiment are in favor of that view which maintains that within certain limits (one ounce to one and a half ounce of absolute alcohol to a healthy man [in divided doses, well duluted with water, in twenty-four hours]) alcohol is oxidized and destroyed in the organism, and yields up force which is applied as nervous, muscular, and gland force."

Dr. B. W. Richardson, says: "Much craving for one thing is the most certain sign of a mad mind. When the physiological truth is understood, that what is called 'stimulation' or excitement, is in absolute fact *relaxation*, a partial paralysis of one of the most prominent mechanisms in the animal body, the minute, resisting, compensating circulation, we grasp quickly the error in respect to the action of 'stimulants' in which we have been educated, and obtain a clear solution of the well-known experience, that all excitement, all passion, leaves after its departure, lowness of heart, depression of mind and sadness of spirit. We learn, then, in respect to narcotics, that the temporary excitement they produce is at the *expense of the normal animal force*, and that the ideas of its being necessary to resort to them, that they may lift up the forces into true, firm and even activity, or that they may *add something useful* to the living tissues, are errors as solemn as they are widely disseminated."

Dr. Cutter, says: "The habitual use of undiluted alcoholics, after a time, induces changes in the walls of a hardening, thickening, and puckering nature, and cause excess of formative action in the gland tissue and the interglandular areolar tissue. At first the gastric juice is augmented, though of inferior quality; later, owing to pressure, the secretion is lessened. After a time the areolar-tissue increase reaches its acme, and contraction of that tissue occurs. Now the

secreting cells, under increasing pressure, waste or change to fat, and gastric secretion wanes. Chronic indigestion is established. Starches and sugars introduced into such a stomach rapidly undergo acid fermentation. Proteids are not digested. Proteids and fats are so altered that intestinal digestion is hindered or stopped. Hence the blood is unable to receive normal new supplies."

"Alcohol is not the warming cordial and invigorating stimulant that it is reputed to be, but there is a world-full of preconceived opinions in its favor that must be met and overcome before the true view can make its way. But the truth must prevail at last. Its true place is not along with the displays of wealth and luxury upon our sideboards, but in the medicine-chest along with hasheesh, henbane, opium, stramonium, and so forth, labeled as a POISON!"—*Dr. A. F. Kinne.*

"It is not enough that alcoholic drinks are dangerous when purely made, but there is an added danger growing out of the almost universal practice of the manufacturers of these drinks to tamper with them and adulterate them with other harmful materials. Not many months ago the city government of Paris caused a testing of all the wines that were brought into the market during a month; there were 1,518 samples of French wine examined, and only 65 found absolutely free from injurious addition—that is, less than 5 per cent. was really pure."—*N. Y. Scientific Times.*

"Dr. Parkes (*Practical Hygiene*) found that brandy augmented the rapidity of the pulse thirteen per cent., and the force was also increased; taking the usual estimate of the heart's work, its daily excess of work, with 4.8 fluid ounces of absolute alcohol, was equal to 15.8 tons lifted one foot. With claret the results were almost identical. The period of rest of the heart was shortened, and its nutrition must

therefore have been interfered with. In another man, Dr. Parkes found from four to eight ounces of brandy produced palpitation and breathlessness."—*De Chaumont.*

Dr. Armstrong says: "If the tongue becomes dry, discontinue alcohol; if moist, the drug is doing good. If the pulse becomes quicker, harm is being done, and the contrary, if slower. If the skin becomes moister, the antipyritic effect of alcohol is obtained and again good is being done. If the breathing becomes easier, continue the drug."

"Of what use is alcohol in medicine? We have a better heart tonic in digitalis; as a lung tonic a vastly better in strychnine; nitrate of amyl acts quicker; atropine warms up better. To tide over a dangerous time we would prefer iron, quinine and strychnine, concentrated food and attention to hygiene. Is it capable of prolonging life, or, in any way assisting nature in throwing off the microbes of disease? The most extravagant claims have been made for it by the laity. It is the one panacea for all the ills to which the human flesh is heir. But when we come to look at its effects in a fair and impartial manner, do not its claims as a therapeutical agent rest on a very unstable foundation?" —*A. W. Tobias, M. D., in Courier of Medicine, Vol. XIII, No. 3.*

"The application of heat over the heart, and application of hot and cold water to the spine in rapid alternation, is a much more effective means of arousing the heart to activity than the administration of alcohol."—*Dr. J. H. Kellogg.*

"The belief that alcohol has the power of arresting phthisical development is one which experience does not sustain. The daily use of alcohol for a time may mask phthisical symptoms, and the patient and his friends may fancy that the progress of the disease is stayed; but soon he reaches a condition in which the disease will make rapid

progress, and in which a large quantity of stimulants will not give relief. It is unfortunate for a phthisical patient to become addicted to the daily use of stimulants. If an individual with developed phthisis reaches complete recovery while taking alcoholic stimulants freely, I am confident that he would have reached it more rapidly and safely without them. Malt liquors and wines do less harm than whiskey and brandy, and are usually more serviceable."—*A. T. Loomis, M. D.*

"The connection between drunkenness and crime and drunkenness and poverty, is close and unvarying in its effect upon society. The remarkable increase of insanity in recent years may in part be traced to the use of intoxicating beverages. It has been asserted that at least seven-tenths of all the crime and poverty and calamity to the people of the United States spring from the abuse of liquors."—*Dr. J. E. Reeves.*

M. Morel sketches the history of four generations as follows: "*First Generation.*—The father was an habitual drunkard, and was killed in a public-house brawl. *Second Generation.*—The son inherited his father's habit, which gave rise to an attack of mania, terminating in paralysis and death. *Third Generation.*—The grandson was strictly sober, but was full of hypochondriacal and imaginary fears of persecutions, etc., and had homicidal tendencies. *Fourth Generation.*—The fourth in descent had very limited intelligence, and had an attack of madness when sixteen years old, terminating in stupidity nearly amounting to idiocy; with him the race probably became extinct."

"Here is a company of 'jolly good fellows,' all standing on their feet, their faces red and radiant, and all swinging their arms and talking at once. These men have been taking alcohol, and, surely, you will say, it has stimulated

them. But if you will attend for a moment to what they are saying, you will see that there is no true brain-stimulation about it. We shall be reminded rather of what Addison says of the difference between the mind of the wise man, and that of the fool: 'There are infinite, numberless extravagancies, and a succession of vanities which pass through both. The great difference is that the first knows how to pick and cull his thoughts for conversation, by suppressing some and communicating others, whereas the other lets them all indifferently fly out in words.' The case with these revelers is precisely this. The poison which they have taken has paralyzed their conservative faculties, and the talking propensity is running on without anything to hold it in check and regulate it."—*Dr. A. F. Kinne.*

"Habits of growing *drunkenness* in parents have the effect of inclining the children to grow up instinctive drunkards, and the first children born, ere the habits are confirmed, are free from the vice which holds the younger children fast in a disgraceful thraldom."—*Fothergill.*

Dr. Wm. Jay Youmans, says: "It is to the nervous system and especially to its great centre, the brain, that alcohol is first attracted after it has entered the circulation. It is to all intents and purposes a cerebral poison."

"Of three hundred idiots in Massachusetts, Dr. Howe referred one hundred and forty-five directly to intemperance. A like proportion of insanity finds a similar reference. If we add to these all the degrees of weakness, imbecility, and deterioration which lie between these extremes of idiocy and insanity on the one hand and sound manhood and sound-mindedness on the other, what a dreadful and unending entail have we as the product of this one vice [of the parents]!" —*Bascom.*

"The first narcotic symptom produced by alcohol is a symptom of incipient paralysis: the flushing of the face is caused by the paralysis of the cervical branch of the sympathetic. This symptom usually occurs some time before the conspicuous manifestations of the ordinary signs of intoxication, which result from paralysis of the cerebrum; we may search in vain among the phenomena of intoxication for any genuine evidences of heightened mental activity, which is said to be followed by a depressive recoil. There is no recoil, there is no stimulation. There is nothing but paralytic disorder from the moment narcosis begins. From the outset the whole nervous system is lowered in tone, the even course of nutrition disturbed, and the rhythmic discharge of its functions interfered with."—*Prof. John Fiske in "Tobacco and Alcohol."*

Dr. James Edmund, of England, says: "We have a great horror of arsenic and fifty other poisons; while the fact is, that all these are a mere bagatelle in relation to the most direct, absolute, immediate, and certain poisonings which are caused by alcohol."

"In most persons alcohol acts at once as an anaesthetic, and lessens also the rapidity of impressions and the perfection of the senses. In other cases it seems to cause increased rapidity of thought, and excites imagination, but even here the power of control over a train of thought is lessened."
—*E. A. Parkes, M. D.*

Dr. William A. Hammond, the eminent New York specialist, and one of the widest known authorities on nervous diseases, says: "The dog retired at once to a corner, and lay down. In forty-five seconds alcohol appeared in his expired breath; in five minutes he could scarcely walk; in fourteen minutes he could not move; in thirty minutes he was profoundly asleep."

Sir Henry Thompson, of London, says: "I have no hesitation in attributing a very large proportion of the most painful and dangerous diseases which come under my care to the ordinary and daily use of the fermented drinks taken in a moderate quantity."

Professor McIntosh says that "five sixths of all who have fallen by cholera in England were persons of intemperate habits."

Dr. Adams, who is a professor in the Medical Department of the University of Glasgow, says: "Alcoholic drinks are one of the great predisposing causes of cholera. I would place the sign over every shop in the city where liquor is sold, CHOLERA SOLD HERE."

"My conviction is fixed, by the experience and observation of a lifetime, that the regular and routine employment of alcoholic stimulants, by a man in health, is never, under any circumstance, useful. I make no exception in favor of cold, or heat, or rain, nor indeed in favor of old drinkers, when we consider them as soldiers."—*Surgeon F. H. Hamilton.*

Dr. Edward Jarvis, of Mass., in an article upon the relation of education to insanity, says: "Intemperance is another cause of much insanity. About 10 per cent. of all stated are said to arise from this vice. This happens more among the poor and ignorant in a civilized society. Savages are protected from this cause of insanity simply by their want of opportunity; but in cultivated communities the means of intoxication are more accessible and obtainable; few are so poor as to be unable to obtain them, and it is noticeable that the poor are the most addicted to this indulgence, and furnish thereby a great portion of the victims of lunacy. * * * We are irresistibly drawn to the conclusion that insanity is a part of the price that we pay for the imperfection of our civiliza-

tion and incompleteness of our education. * * * Our children will be required to pay the same price until all men, women and youths shall be educated to know the law of their being, and to feel and sustain their responsibility for the faithful management of the brain and mind, and the other organs and functions intrusted to their care."

"The mental disturbance of delirum tremens cannot be due to a direct action of alcohol in the blood or in the nerve-tissues at the time of the breaking out of the disease. The 'horrors' of the drunkard is the beginning of delirum tremens, and if the cerebral manifestations of the horrors or of the delirum tremens were due to a direct action of the alcohol, then they should be intensified, not relieved by further doses of the poison. Evidently, the symptoms are the result of nutritive changes in the ganglionic protoplasm which has been produced by the poison. In other words, the symptoms are only indirectly caused by alcohol."—*Dr. Wood.*

TOBACCO.

"Of tobacco, Franklin said that he could not think it had done much good in the world, since he never knew a person who used it habitually who would recommend another to do the same."

"An illustration of the depressing influence of tobacco is given by Dr. Jacob Bigelow, who states that soldiers, when wishing to shirk duty and get on the silk-list, sometimes succeed in bringing on the symptoms of alarming sickness by wearing a piece of tobacco under each arm-pit. The skin absorbs sufficient of the poison to affect the system to a marked degree."

Says a famed physician, after long and close observation of the evil effects of *tobacco*: "If the evil ended with the individual who, by the indulgence of a pernicious custom, injures his own health and impairs his faculties of mind and body, he might be left to his enjoyment, his fool's paradise, unmolested. This, however, is not the case. In no instance is the sin of the father more strikingly visited upon the children than in the sin of tobacco-smoking. The enervation, the hysteria, the insanity, the dwarfish deformities, the consumption, the suffering lives and early deaths of the children of *inveterate smokers* bear ample testimony to the feebleness and unsoundness of the constitution transmitted by this pernicious habit."

"The end of all science is to secure long life and good health to the individual and the race, and it ought to be a part of the rational creed of every good man and woman to abjure the use of tobacco, and keep others from falling into the vice."—*Dr. C. R. Drysdale.*

"Hand in hand with the revenues derived from the import on tobacco, insanity, general and progressive paralysis, softening of the brain and spinal marrow, and cancerous diseases of the lip and tongue have increased."—*M. Jolly, Acad. de Méd.*

"Tobacco is certainly not a food for man, nor has it much value as a medicine. The tobacco-worm is the only animal known to thrive upon it."—*F. H. Hamilton.*

Prof. Mantegazza, of Florence, Italy, a distinguished sanitarian and physician, testifies that "Tobacco is never necessary; it is always hurtful to boys and young men, to weak people, and those disposed to consumption. * * * * All good citizens should try to put a stop to the general invasion of tobacco, which threatens to involve the whole of Europe in a dense cloud of smoke, which poisons even those who do not smoke."

"My observation of eye diseases, extending through a period of more than twenty-five years, has convinced me that, besides the pernicious effects of tobacco in other respects, greatly impaired vision, not unfrequently blindness, has been occasioned by the use of this agent."—*Wm. Dickinson, M.D.*

"It (tobacco) should be not only denounced, but the student who uses it should be expelled, on the ground that the practice is unfit for a scholar and a gentleman."—*Horace Mann.*

Dr. J. C. Mulhall, says: "The evils of cigarette smoking are largely due to the habit of inhaling, and therein this method of using tobacco differs from all others. The smoke does not go below the first division of the bronchi. The result of inhalation is, physiologically speaking, a pleasureable irritation of the laryngeal and tracheal filaments of the pneumogastric nerve—a sort of nicotine satisfaction. This is in amount according to the absorbing surface, which from

the added laryngeal and tracheal areas has been estimated to be three times as great in inhalers as in non-inhalers."

"*Smoking* tobacco weakens the nervous powers, favors a dreamy, imaginative, and imbecile state of mind, produces indolence and incapacity for manly or continuous exertion, and sinks its votary into a state of careless or maudlin inactivity, and selfish enjoyment of his vice."—*James Copeland, M. D.*

"The vast majority of smokers—seven out of every ten—can, without the least danger or inconvenience, cease smoking totally and forever. I was myself a smoker for thirty years, but I am now free; I can work better and longer than before; I have less headache; I have a better opinion of myself; I enjoy exercise more, and step out much more vigorously; my room is cleaner; I think I am better tempered, as well as more cheerful and satisfied; it did not pay to smoke, but most decidedly it pays to stop smoking."—*James Parton.*

"*I know of no single vice which does so much harm as smoking.* It is a snare and a delusion. It soothes the excited nervous system at the time to render it more irritable and more feeble ultimately. Of the causes of general paralysis smoking is one."—*Surgeon Sully.*

"I believe that no one who smokes tobacco before the bodily powers are developed ever makes a strong, vigorous man."—*Dr. Fergus Fergusson.*

"In Germany if a boy is caught smoking he is locked up. The government has become anxious about the effect of tobacco on the physique of the soldiers of the future, and in order to rectify in some measure the evil, ordered the police to arrest all boys found smoking in the streets if they are under sixteen years old, and to have them punished by fine and imprisonment."—*M. L. Holbrook, M. D.*

"It is painful to contemplate how many promising youths must be stunted in their growth and enfeebled in their minds from the use of tobacco before they arrive at manhood." *Prof. Ligars, of Edinburgh.*

"The effects of tobacco, often severe even upon those who have attained to manhood, are especially severe upon the young who are still in the stage of adolescency. In them it causes impairment of growth, premature manhood, and physical prostration."—*B. W. Richardson, M. D., F. R. S.*

"Smoking prevents the healthy nutrition of the several structures of the body. Hence comes, especially in young persons, an arrest of the growth of the body, low stature, a pallid and sallow hue of the surface, and unhealthy supply of the blood and weak bodily powers."—*Dr. Copland, F. R. S., of England.*

OPIUM.

Opium is obtained from the juice of unripe capsules of the poppy, or *Papaver somniferum.* The plant is a native of Asia, though it is now cultivated in many parts of the world. For centuries opium has been used to produce its peculiar intoxication. "When opium is taken," says Dr. H. C. Wood, "in such dose as to produce its mildest physiological effect, it exerts a quieting influence, inducing a peculiar dreamy condition, * * * during which images and ideas float before the mind, and by their endless and effortless repetition shorten the time, which seems to lose itself in rest. It is commonly asserted that there is a stage of the action of opium in which the activity of the mental faculties is exalted. This may be so in some persons, and especially in those who have accustomed themselves to the use of the drug as a stimulant; but my experience is that in those who do not habitually take opium true mental power is, during all the stages of the action of the drug, diminished rather than increased."

Morphia is the chief active principle to which opium owes its peculiar intoxicating property. The number of opium users is increasing in the United States as well as in China and other Asiatic countries. The United States imported about 72,000 pounds of opium yearly at the close of the Civil War; in 1880 about 372,000; and at the present the annual import is nearly 1,000,000 pounds. This rapid increase is largely out of proportion to the increase of population and the legitimate demands of medicine.

The habitual user of opium loses his appetite, becomes spare of body, and his skin grows sallow and parchment-like.

"There is," says Dr. Cutter, "a marked deterioration of the will-power and of the memory, a manifest inclination to deceive and lie about the habit, a noticeable lack of attention to proper business, and a decided change in the moral tone."

Most soothing syrups and cough medicines that do not belong to the proprietary class contain opiates and should be regarded very scrupulously, and as unsafe remedies.

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BUTLER, IND., June 24, 1895.

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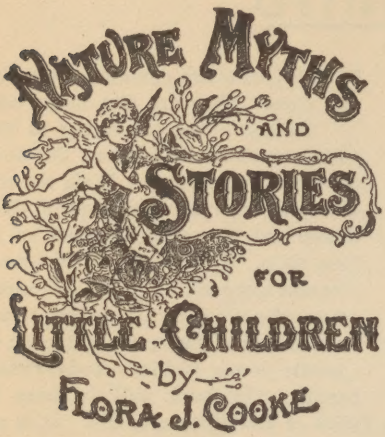

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